JAPYGIDAE OF NORTH AMERICA 2. THE GENUS HOLJAPYX AND DESCRIPTIONS OF NEW SPECIES

Leslie M. Smith
University of California, Davis

The genus *Holjapyx* was established by Silvestri (1948) to contain the single American species *diversiunguis*. This species was originally described as *Japyx diversiunguis* by Silvestri in 1910. No other species of this genus have been described to date from America. Pagés (1952) described ? *H. forsteri*, ? *H. forsteri archeyi*, and ? *H. punamuensis* from New Zealand but was doubtful that these species were properly assigned to *Holjapyx*. *H. forsteri* has 28 segments in the antennae, *H. punamuensis* has 33, and males of both species are without male sacs in the third and fourth abdominal segments. Further study of New Zealand japygids may establish their proper generic relationship. Paclt (1957) placed *Holjapyx* as a synonym of *Burmjapyx* Silvestri (1930). After studying the nine new species presented in this paper, I conclude that the genus *Holjapyx* is distinct from *Burmjapyx*.

Genus Holjapyx Silv. 1948, emend. L. M. Smith

Antenna with 26 segments, trichobothria subequal to M[1] on the same segment, terminal segment lanceolate, longer than wide with three placoid sensillae. First lamina of lacinia pectinate with five to ten teeth; a small spine between lamina three and four. Lateral subcoxal organs with one to four rows of long glandular setae and one row of shorter and much thinner sensory setae. Median subcoxal organ area wrinkled, without disculi or setae, except 2+2 minute setae at a 45° angle to mid-line. Styli with a distinct secondary cone, Sr = 0.25–0.38. Male (in most species) with a median ventral sac opening on the scutum of abdominal segments III and IV, each containing one to ten minutely plumose small setae directed toward the posterior. Postero-lateral angles of tergite VII obtuse, right, acute, or projected to rear as lobes. Segment X, W:L = 0.95–1.13, one or two median M. Acropygidium small, rounded. Rectum visible through tergite X with an irregular row of internal, short, stout setae directed posteriorly on each side of rectum eight to 28 setae per row.

Forceps: R=0.371–0.541, one prominent tooth on each forcep, predental tubercles of left forcep always biserrate, predental tubercles of right forcep usually uniserrate, but in some species biserrate. Post-dental margins of both forceps crenulate or smooth. Genital orifice of male ringed anteriorly with one row of extremely small setae and posteriorly with one row of 12 larger setae, genital papillae conical, as wide as long, each with about 45 setae, mostly on the mesad side. Genital orifice of female not ringed with setae, two short anterior papillae three times as wide as long and one pair of larger posterior papillae as wide as long; all papillae with normal setate and a few very short sense setae; on each side of the genital opening a small, slightly raised area with 5–10 short sense setae close together.

---

[1] Abbreviations: M—macrosetae; m—submacrosetae; R—x/y, see fig. 20; x—distance from tooth to tip of left forcep; y—distance from basal articulation to tip of left forcep; Sr—ratio of length of secondary cone of stylus VII to length of stylus.

Type species: *Holjapyx diversiunguis* (Silv.). This genus is close to *Occasjapyx* but differs from it in the presence of five pectinate laminae on the lacinia, a single large tooth on each forcep, two more segments in the antennae, and setae in the rectum.

Holjapyx calaverasae L. Smith, new species

Female.—*Head* dorsum with about 12 + 12 M and 15 + 15 m, antennae typical, mandible with four distinct teeth, fifth, basal tooth indicated by small hump, inner surface of labrum with 11+11 similar, short, stout setae, outer surface of labrum with 26+26 setae of various sizes, first lamina of lacinia with four teeth, maxillary palpus with 12 setae, thumb of galea with nine sensory cones, tip of glossa of labium fringed with 23 setae, labial palpus W:L=0.46, with 6 M and 3 m. *Thorax*, pronotum prescutum 1+1 M and 1+1 m, scutum 4+4 M and 6+6 m, mesonotum prescutum 1+1 M and 1+1 m,scutum 5+5 M and 11+11 m, metanotum prescutum 1+1 M and 1+1 m, scutum 5+5 M and 11+11 m. Legs long, leg III 2.34 times length of forcep, dorsal apex of femur with a transverse row of five setae; large ventral setae per row on tarsus, 4. *Abdomen*, tergite I 3+3 M and 10+10 m, tergite II 4+4 M and 16+16 m, tergites III–VII 7+7 M and about 18+18 m, postero-lateral angles of tergite VII obtuse, not lobed, tergite VIII 5+5 M and about 14+14 m, tergite IX 3 + 3 m, tergite X 2 + 2 + 2 M and 11+11 m, carinae not sclerotized, setae in rectum about 15; pleura II–VII pleurite 1 m, pleuron 1 M and 6–8 m, sternum I apotome 3 + 3 M and 5 + 6 m, scutum 13+13 M and about 30+30 m, lateral subcoxal organs one-third as broad as distance between styli; two rows glandular setae about 60+60 and one row sensory setae 30+30, median subcoxal area typical, sternum II apotome without setae, scutum 17 + 17 M and 17 + 17 m, sterna III–VII similar to II, sternum VIII 7+7 M and 12+12 m, sternum IX 2+2 M and 3+3 m, sternum X 10+10 M and about 20+20 m, genitalia typical, sense setae on anterior papillae 2+3, sense setae clusters laterad of genital pore 7 + 7, sense setae on posterior papillae 3 + 3, Sr=0.83. *Forceps.* Left arm with one tooth, R=0.371 tooth distinct, not fused with postdental margin, predental tubercles 5/6 upper row a cluster of four basally (some specimens 4/5), and one distal removed, postdental margin curved, smooth with three faint denticles; right arm with one tooth, predental margin with two monoserrated denticles, postdental margin with eight obscure denticles basally.

Male.—Similar to female except: six very small setae mesad in median subcoxal area, male sacs in III and IV without setae, Sr=0.32, median subcoxal organs with three rows glandular setae, setae in rectum 17, R=0.371, left arm forceps postdental margin smooth, curved, right arm forceps, postdental margin crenulate, curved.

Holotype female, one male paratype, seven female paratypes, and one juvenile, TWO MILES WEST OF SAN ANDREAS, CALAVERAS COUNTY, CALIFORNIA, March 25, 1958 (L. M. Smith and R. O. Schuster), altitude 1,000 feet, sandy clay loam soil, pH 8, 20° slope, under *Quercus wislizenii.*

Holotype female and paratype male in California Academy of Sciences; paratype females in the California Insect Survey, U.S. National Museum, and University of California, Davis.

Holjapyx schusteri L. Smith, new species

Female.—Similar to *H. calaverasae* L. Smith, except: first lamina of lacinia with 11 teeth, tip of glossae with 26–28 setae, labial palpus W:L=0.50 with 6 M and 2 m, dorsal apex of femur with a transverse row of four setae, tergite I 3+3 M, tergite II 5+5 M and 14+14 m, tergite IX 1+1 M and 2+2 m, tergite X 2+1+2, setae in rectum about 30, faintly plumose, postero-lateral angles of tergite VII acute, not lobed, sternum I scutum about 15+15 M, one row of 11+11 uniform m immediately anterior to lateral subcoxal organs, lateral subcoxal organs and median subcoxal organ each occupying 0.14 of the distance between styli, lateral subcoxal organs with 2–5+2–5 glandular setae in one row and one row of 10+10 sensory setae, one-third as long as glandular setae, sternum IX 3+3 M and 3+3 m, sense setae clusters laterad of genital pore 8+8, sense setae on posterior genital papillae 4+5, Sr=0.32.

Forceps, left arm with one tooth, R=0.385, tooth distinct, not fused with postdental margin, predental tubercles 6/7, postdental margin curved with 11 crenulations; right arm with one tooth, predental tubercles 1/2, postdental margin curved with 14 crenulations.

Male.—Similar to female except: labial palpus with 5 M and 4 m, lateral subcoxal organs with 2+2 large glandular setae (one specimen 3+4) and 8+9 small sensory setae, male sacs in III and IV not visible; genital orifice anterior plate with irregular arrangement of about 20 long setae, anterior to pore 21 very small irregularly arranged glandular setae, posterior to pore a regular row of 10 medium setae, posterior plate with about 40 large setae, genital papillae W:L=0.31 with about 20 setae, laterad setae twice as long as mesad setae, and one group of three very short sense setae laterad and one such seta near the tip, forceps as in female, R=0.427.

Holotype female, 1♂ paratype, 1♀ paratype, and 1♀ juvenile, ONE MILE WEST OF SAN ANDREAS LAKE, SAN MATEO COUNTY, CALIFORNIA, November 1956, November 1957, and January 1957, in soil, open grassland and under live oak (D. W. Price), and

1♂ collected by Mr. G. A. Marsh on Mount Diablo, Contra Costa County, California, February 15, 1953. Holotype and paratype ♂ in California Academy of Sciences; paratype ♀ and ♂ in U.S. National Museum.

I take pleasure in naming this species after Mr. Robert O. Schuster.

Holjapyx humidus L. Smith, new species

Female.—Similar to *H. calaverasae* L. Smith, except: first lamina of lacinia with 8–10 teeth, thumb of galea with 15 minute setae, tip of glossa of labium tipped with 32 setae, labial palpus W:L=0.47 with 10 M and 2 m, mesonotum and metanotum prescutum 1+1 M and 2+3 m, dorsal apex of femur with a transverse row of six setae, abdominal tergite I 2+2 M and about 15+15 m, setae in rectum 46 not visibly plumose, postero-lateral angles tergite VII acute but not lobed, sense setae on posterior genital papillae 4+4, tergum X 2+2+2 M, sense setae clusters laterad of genital pore 14+14, Sr=0.29. Forceps: R=0.454, left predental tubercles 5/7 upper row not grouped, no postdental tubercles.

Male.—Similar to male of *H. calaverasae* L. Smith, except: male sac III with about 16 bilaterally plumose setae, male sac IV with about 12 similar setae, Sr=0.27, setae in rectum 25, R=0.500, left forcep predental tubercles 6/7.

Holotype female, MENDOCINO, MENDOCINO COUNTY, CALIFORNIA, December 25, 1958, and paratype male same locality June 4, 1954 (J. R. Helfer). Both deposited California Academy of Sciences, San Francisco.

Holjapyx hyadis L. Smith, new species

Female.—Similar to *H. calaverasae* L. Smith, except: labial palpus W:L=0.40, with 6 M and 4 m, thorax mesonotum prescutum 1+1 M and 2+2 m, mesonotum, prescutum 1+1 M and 2+2 m, dorsal apex of femur with a transverse row of six setae, setae in rectum not visible, tergite I 2+2 M, tergite X 2+1+2 M lateral subcoxal organ with one irregular row of 25+25 long glandular setae and one row of 25+25 small sensory setae, sense setae on genitalia not visible, Sr=0.30, forceps: R=0.455.

Male.—Similar to male of *H. calaverasae* L. Smith except: first lamina of lacinia with six teeth, labial palpus W:L=0.36, dorsal apex of femur with a transverse row of six setae, median subcoxal organs with two rows glandular setae, male sacs in III and IV each with one simple seta, Sr=0.31, setae in rectum not visible, R=0.450, forceps left arm predental tubercles 5/5.

Holotype female and allotype male, KINGS MOUNTAIN, SAN MATEO COUNTY, CALIFORNIA, December, 1957 (D. W. Price). Kings Mountain is four miles north of Lahonda. The specimens were found in deep humus of redwood, madrone, and tan bark oak. The area probably remains moist throughout the year.

Holotype and allotype deposited in the California Academy of Sciences.

Holjapyx conspersus L. Smith, new species

Female.—Similar to female of *H. calaverasae* L. Smith except: labial palpus W:L=0.33 with 6 M and 6 m, pronotum scutum 4+4 M and 9+9 m, mesonotum prescutum 1+1 M and 2+2 m, dorsal apex of femur with transverse row of six setae, postero-lateral angles of tergite VII distinctly lobed, abdominal tergite I with 2+2 M, tergite X 2+1+2 M and about 11+11 m, carinae sclerotized, setae in rectum 17, lateral subcoxal organs with two rows of glandular setae, about 70+70, sense setae clusters laterad of genital pore 8+8, Sr=0.29; forceps R=0.474, tooth left arm fused with postdental margin, predental tubercles 6/8 upper row three large denticles proximal and three smaller denticles distal.

Male.—Similar to male of *H. calaverasae* L. Smith except: small setae absent in median subcoxal area, male sac III setae obscured, male sac IV with four small setae, minutely plumose, Sr=0.36, median subcoxal organs with two rows of glandular setae, setae in rectum obscured; forceps: R=0.467, left arm predental tubercles 3/5.

Holotype female and allotype male, THREE MILES NORTH OF SHARP PARK, SAN MATEO COUNTY, CALIFORNIA, February, 1958 (D. W. Price) in humus under chaparral, especially coffee berry, christmas berry, coyote brush and scrub oak. Holotype and allotype deposited in the California Academy of Sciences.

Holjapyx imbutus L. Smith, new species

Male.—Similar to male of *H. calaverasae* L. Smith except: trichobothria two-thirds as long as longest seta on same antennal segment, labial palpus W:L=0.40 with 6 M and 4 m, mesonotum prescutum 1+1 M and 2+2 m, setae per transverse row on dorsal apex of femora: leg 1 and 2, five each, leg 3, six; postero-lateral angles of tergite VII right-angles, tergite I with 3+3 M, tergite X 2+2+2 M, lateral subcoxal organs occupy 0.76 of distance between styli, three rows glandular setae, about 90+90, lateral genital papillae each with about 20 large setae mainly lateral, and a compact mass of about 35 setae mesad, male sac in III with three curved plumose setae, male sac in IV with one curved plumose seta, Sr=0.30, setae in rectum 19, R=0.438, forceps left arm predental tubercles 6/3 (others 4/4 and 6/7) tooth distinct, postdental margin straight, smooth, right arm predental tubercles typical, postdental margin straight with three distinct denticles near tooth and crenulations distad.

Female unknown.

Holotype male, ONE MILE NORTH OF MURPHYS, CALAVERAS COUNTY, CALIFORNIA, March 5, 1958 (L. M. Smith and R. O. Schuster), in humus under oak tree. Paratype ♂ and one juvenile, three miles west of San Andreas, Calaveras County, California, March 25, 1958 (L. M. Smith and R. O. Schuster), in wet humus and soil; paratype ♂, Calaveras Big Trees, Calaveras County, March 5, 1958 (L. M. Smith and R. O. Schuster), in rotten redwood log, soil temperature 3" deep 4°C.

Holotype male in California Academy of Sciences, paratype males in the California Insect Survey and University of California, Davis.

Holjapyx insiccatus L. Smith, new species

Female.—Similar to *H. calaverasae* L. Smith except: 1st lamina of lacinia with seven teeth, maxillary palpus with 12 setae and two minute sensory cones at the apex, labial palpus W:L=0.23 with 6 M and 4 m, mesonotum and metanotum prescutum 1+1 M and 2+2 m, dorsal apex of femora with a transverse row of six setae, abdominal tergite I 2+2 M and 12+12 m, postero-lateral angles of tergite VII right angles, tergite X 2+1+2 M, carinae sclerotized, setae in rectum 26, simple, lateral subcoxal organs with three rows glandular setae, Sr=0.30, forceps, left arm predental tubercles 7/6, strongly developed, uniformly spaced, R=0.467, right arm predental tubercles two, postdental margin crenulate with 13 crenulations visible.

Male unknown.

Holotype female and paratype female, NINE MILES SOUTH OF MONTICELLO, NAPA COUNTY, CALIFORNIA, December 13, 1957 (L. M. Smith and R. O. Schuster), on grassy slope under stones, one juvenile same locality May 12, 1957 (L. M. Smith and R. O. Schuster).

Holotype ♀ in California Academy of Sciences, paratype ♀ in the California Insect Survey.

Holjapyx irroratus L. Smith, new species

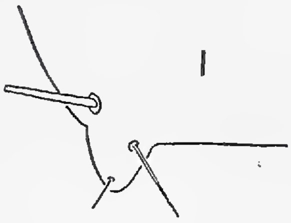
Female.—Similar to *H. calaverasae* L. Smith except: maxillary palpus with 15 setae and two minute sensory cones at the apex, thumb of galea with 15 sensory cones, tip of glossa of labium fringed with 27 setae,

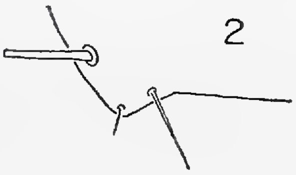
---

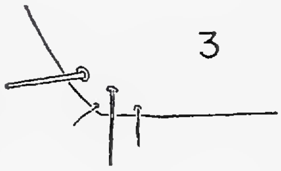
EXPLANATION OF FIGURES

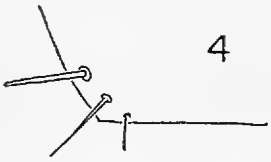
Figs. 1–8, postero-lateral angles of seventh abdominal tergite: (e=0.50 mm.) 1. *Holjapyx conspersus* ♀, 2. *H. diversiunguis* ♀, 3. *H. humidus* ♀, 4. *H. madidus* ♂, 5, *H. irroratus* ♀, 6. *H. calaverasae* ♀, 7. *H. insiccatus* ♀, 8. *H. schusteri* ♀, 9. lateral subcoxal organ *H. schusteri* ♀ showing five glandular setae and ten sense setae, 10. small portion of lateral subcoxal organ of *H. humidus* ♂ showing three rows of glandular setae and one row of sense setae (e=0.054 mm.), 11. dorsal view of tenth abdominal tergite of *H. irroratus* ♀ showing 2+2+2 M and rectal setae (e=0.50 mm.), 12. ventral view of third and fourth abdominal sternites of *H. humidus* ♂ showing male setose sacs (e=0.50 mm.), 13. Male setose sac from fourth abdominal segment of *H. humidus*.

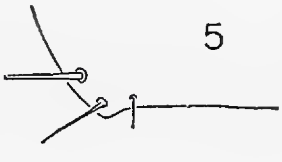
labial palpus W:L=0.34 with 6 M and 4 m, dorsal apex of femur with transverse row of six setae, abdominal tergite I 2+2 M and 10+10 m, postero-lateral angles of tergite VII acute, not lobed, tergite X 2+2+2 M, carinae sclerotized, setae in rectum 25, median subcoxal area slightly wider than either lateral subcoxal organ, lateral subcoxal organs with one row glandular setae 22+22, one row sense setae 25+25, sense setae

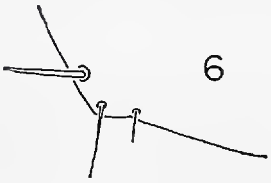

1

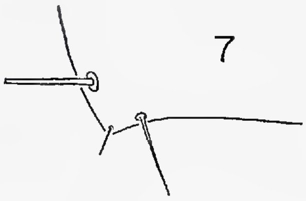

2

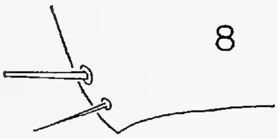

3

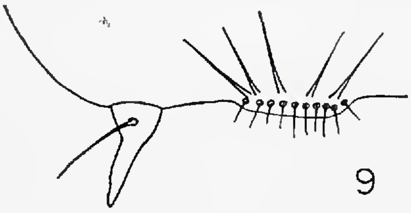

4

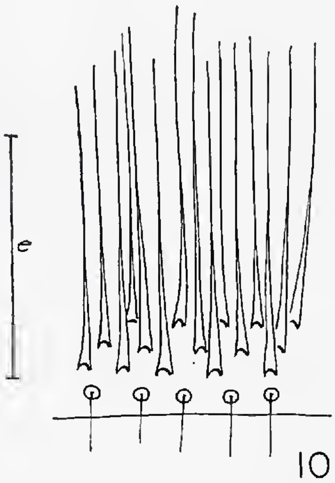

5


6

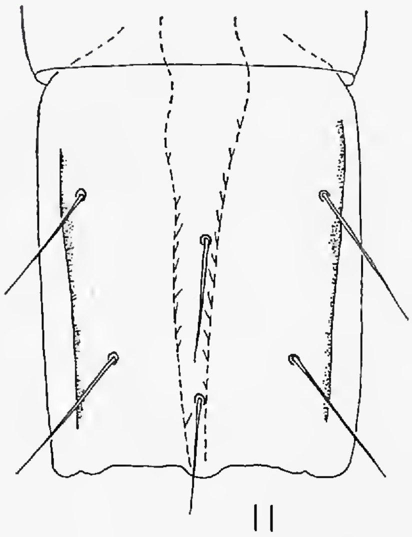

7

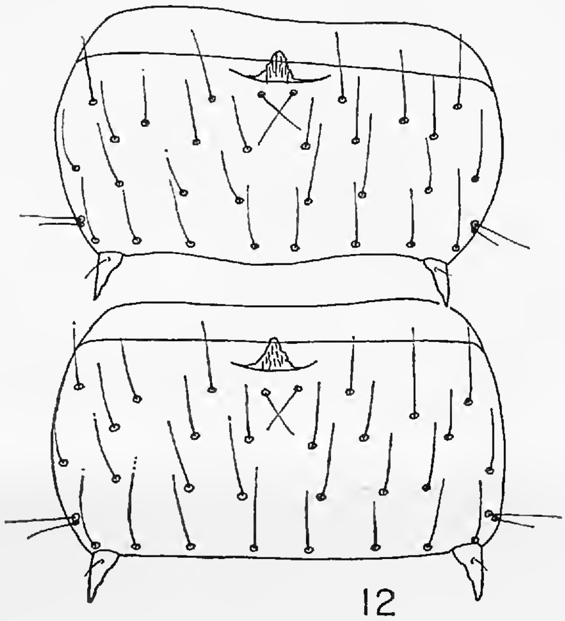

8

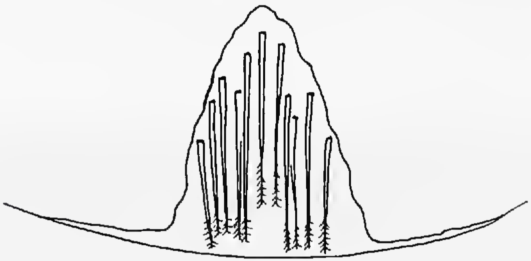

9



10


11


12


13

clusters laterad of genital pore 9+10. Sr=0.27, forceps left arm R=0.413, predental tubercles 6/6, postdental margin nearly smooth, curved, right arm tooth distinct, postdental margin with 10 visible crenulations.

Male unknown.

Holotype female and paratype female, ARMSTRONG STATE PARK, SONOMA COUNTY, CALIFORNIA, March 14, 1954 (J. Helfer), in humus under redwood trees. Holotype ♀ in California Academy of Sciences, paratype ♀ in the California Insect Survey.

Holjapyx madidus L. Smith, new species

Male.—Similar to *H. calaverasae* L. Smith except: outer surface of labrum with 19 setae, labial palpus W:L=0.34, with 6 M and 2 or 3 m, mesonotum prescutum 1+1 M and 2+2 m, abdominal tergite I 2+2 M and 10+10 m, male sacs in III with two plumose setae, IV with one similar seta, postero-lateral angles tergite VII obtuse, not lobed, carinae sclerotized, setae in rectum 15, sternum I apotome 3+3 M and 2+2 m, lateral subcoxal organs with one row glandular setae, 24+24, Sr=0.37, forceps left arm, R=0.532, predental tubercles 4/4, tooth fused with postdental margin, postdental margin smooth, curved, right arm predental tubercles 1/1, postdental margin slightly crenulate, curved.

Female unknown.

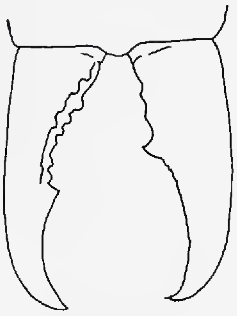
Holotype male, NEAR NASHVILLE, EL DORADO COUNTY, CALIFORNIA, March 5, 1958 (L. M. Smith and R. O. Schuster), in rocky soil, deposited in the California Academy of Sciences.

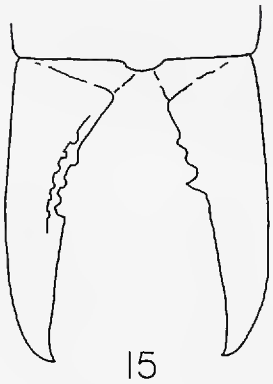
HOLJAPYX DIVERSIUNGUIS Silvestri

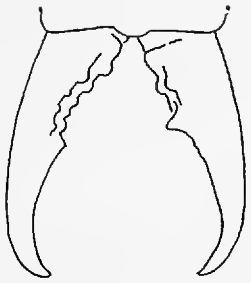
Female.—Similar to *H. calaverasae* L. Smith except: first lamina of lacinia with 10 teeth, maxillary palpus with 17 setae, labial palpus W:L=0.34, abdominal tergite I 2+2 M and 10+10 m, postero-lateral angles of tergite VII obtuse, not lobed, tergite VIII 4+4 M and about 10+10 m, tergite X 2+1+2 M and 11+11 m, carinae sclerotized, setae in rectum 56 not plumose, lateral subcoxal organs with two rows of glandular setae about 55+55, and one row sensory setae 35+35, sense setae clusters laterad of genital pore 8+8, Sr=0.26, forceps left arm R=0.500, predental tubercles 8/7, tooth fused with postdental margin, postdental margin smooth, curved, right arm postdental margin crenulate with 14 crenulations visible.

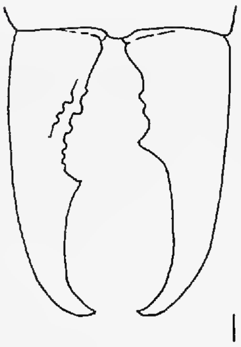
Male.—Similar to the female above except: male sac in III with eight plumose setae, male sac in IV with six plumose setae, Sr=0.28 median subcoxal organs with three rows of glandular setae, setae in rectum 52, not plumose, forceps left arm R=0.541, predental tubercles 7/9, right arm predental tubercles two or three, postdental margin crenulate with 17 crenulations visible.

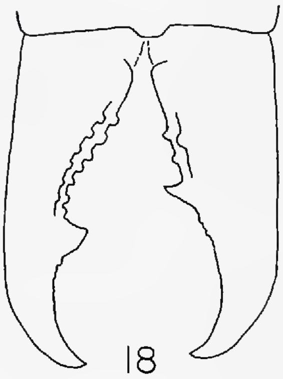
Material examined: One male, Berkeley, California, March 24, 1938 (A. E. Michelbacher), determined by Dr. F. Silvestri, one male Mill Valley, Marin County, California, May 5, 1950 (Hugh B. Leech), in damp soil, and one female Mill Valley, May 9, 1955, collected by Mr. Leech in soil.

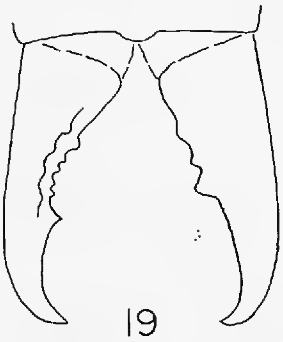

14

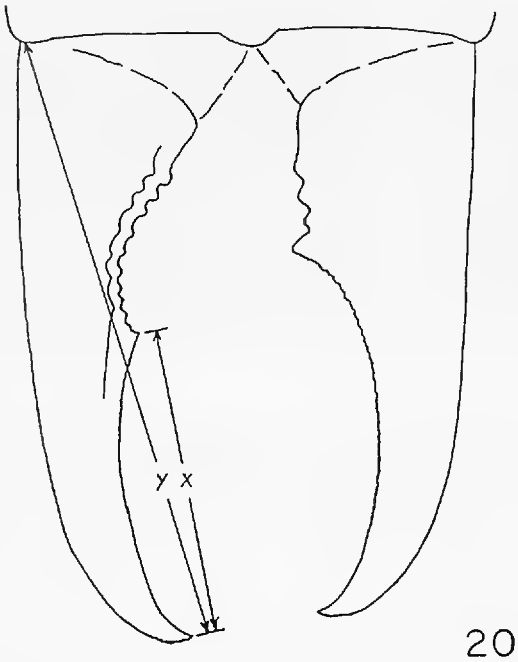

15


16

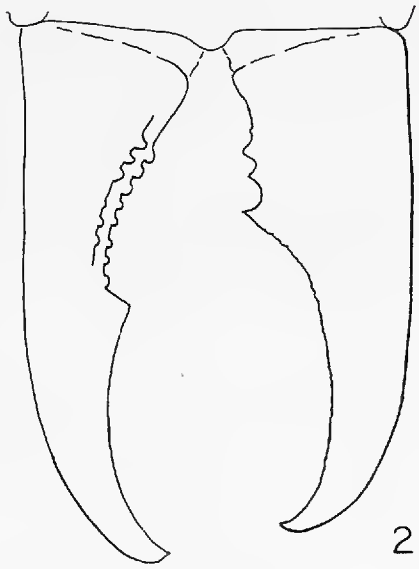

17


18


19



20


21

Explanation of Figures

Figs. 14–21, dorsal view of forceps (e=1.00 mm.): 14. *H. hyadis* ♀, 15. *H. imbutus* ♂, 16. *H. madidus* ♂, 17. *H. conspersus* ♂, 18. *H. schusteri* ♀, 19. *H. calaverasae* ♂, 20. *H. diversiunguis* Silv. ♂, 21. *H. conspersus* ♀. R=x/y as shown in fig. 20.

KEY TO THE SPECIES OF HOLJAPYX SILVESTRI

1. Abdominal tergite X with 2+2+2 M.......... 2
   Abdominal tergite X with 2+1+2 M.......... 6
2. Abdominal tergite I with 3+3 M.......... 3
   Abdominal tergite I with 2+2 M.......... 4
3. Tooth on left arm of forceps fused with postdental margin, R=0.438.......... *imbutus* L. Smith
   Tooth on left arm of forceps not fused with postdental margin, R=0.371.......... *calaverasae* L. Smith
4. Predental tubercles on right arm of forceps 1/1, R=0.532.......... *madidus* L. Smith
   Predental tubercles on right arm monoseriate, R less than 0.500.......... 5
5. Lateral subcoxal organs with one row of glandular setae, 22+22.......... *irroratus* L. Smith
   Lateral subcoxal organs with two or three rows of glandular setae, 60 to 100 + 60 to 100.......... *humidus* L. Smith
6. Predental tubercles of right arm of forceps biseriate, 1/2.......... *schusteri* L. Smith
   Predental tubercles of right arm of forceps uniseriate.......... 7
7. Postero-lateral angles of seventh tergite distinctly lobed.......... *conspersus* L. Smith
   Postero-lateral angles of seventh tergite acute or obtuse, but not lobed.......... 8
8. Postero-lateral angles of seventh tergite obtuse, rounded, in female R=0.463, lateral subcoxal organs with one irregular row glandular setae 25+25.......... *hyadis* L. Smith
   Postero-lateral angles of seventh tergite, acute, slightly projecting, in female lateral subcoxal organs with two rows of glandular setae 50 to 65+50 to 65.......... 9
9. Left arm of forceps with tooth distinct, female, R=0.463.......... *insiccatus* L. Smith
   Tooth fused with postdental margin, female, R=0.500.......... *diversiunguis* (Silvestri)

LITERATURE CITED

PACLT, J.
1957. Diplura. Genera Insectorum, fasc. 212, 1–123, Crainhem, Belgium.

PAGES, J.
1952. Diploures Japygidés de Nouvelle-Zélande. Rec. Canterbury Mus. (Christchurch, N. Z.) 6:149–162.

SILVESTRI, F.
1910. Materiali per lo studio dei Tisanuri. Boll. Lab. Zool. Portici. 6:72–87.
1930. Contributions to a knowledge of the Indo-Malayan Japygidae (Thysanura). Rec. Ind. Mus. 32:439–489.
1948. Descrizioni di alcumi Japyginae (Insecta Diplura) del Nord America. Boll. Lab. Entomol. Agr. Portici 8:118–136.